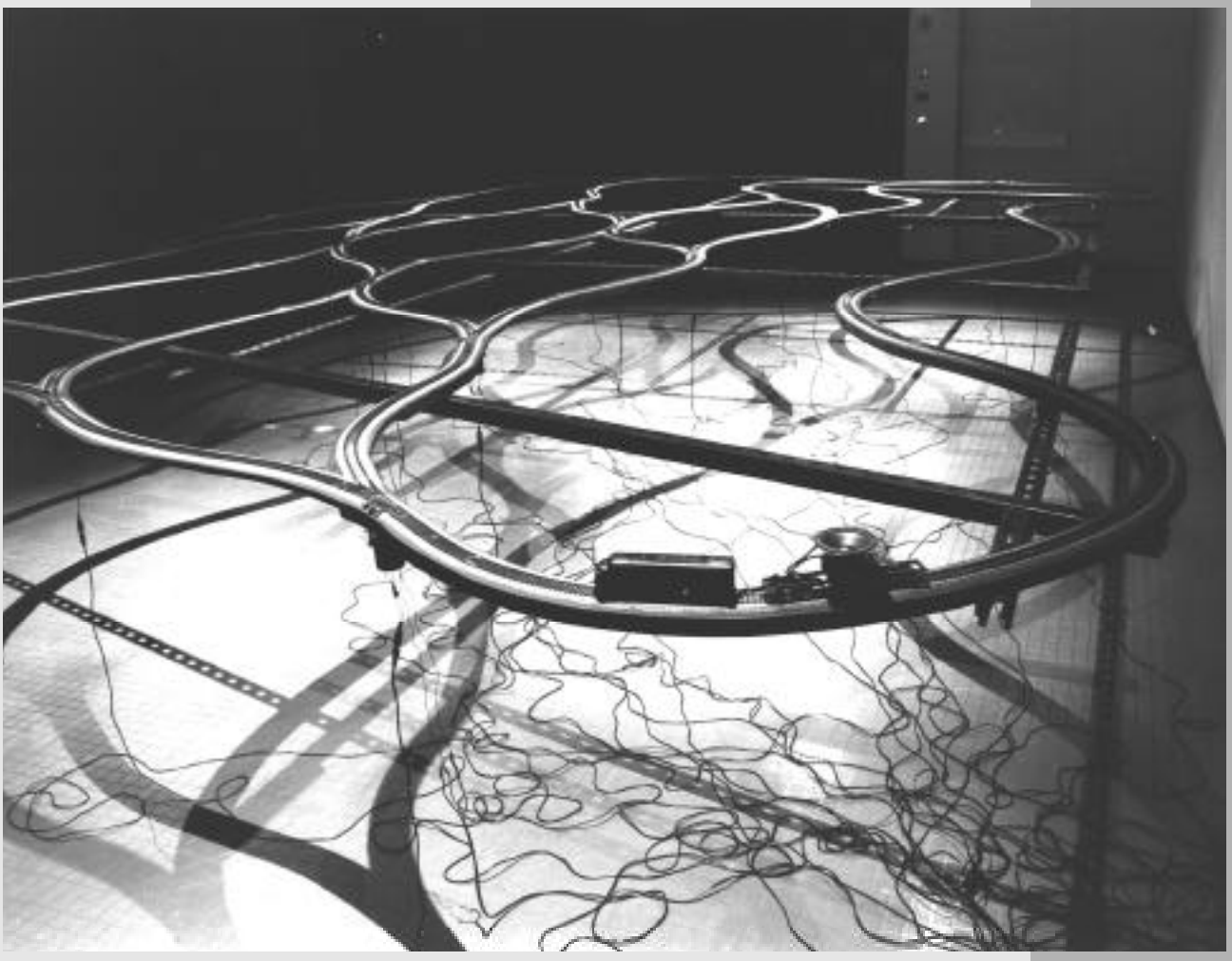
NEWSLETTER number. 10 volume 19 Sept./Oct. 1999

Artists Using Science and Technology

NEW DIRECTIONS: RECENT SOUND ART



New Directions: Recent Sound Art

While digital media and other advances in recording technology have made CDs by musicians and sound-artists fairly ubiquitous, at the same time other technological advances have been allowing artists to work in new ways outside the boundaries of phonography (and in areas other than live performance). One example of this is in the area of sound installation and performance where through various means a work may be generated and/or controlled by an ongoing process or algorithm created by the artist. This work is fundamentally different than recorded music in several respects. First, the sounds themselves are not necessarily fixed and the work created as a result of whatever process or interaction is being employed is free to evolve and change indefinitely (and possibly unpredictably). Also, the sounds need not be created by speakers (as is required with tape) but may be created by other means (for instance by a mechanical mechanism, wind, etc.) which bypass the use of sound transducers in favor of more "direct" production of sounds. Finally, these works escape the finite length of the recording medium by allowing pieces to perpetually evolve without repetition. While there are certainly many historical precedents for this work both in art and in experimental music, one reason that this activity is becoming much more widespread at the moment is undoubtedly the development of increasingly artist-accessible technologies in the area of electronics, micro-controllers, and personal computers, all of which greatly facilitate the realization of such autonomous, process-oriented works.

This issue of YLEM presents overviews of the current work of three artist/musicians who are each working with sound and music which is created and/or controlled in some way by an ongoing autonomous process. In each of these artist's work, various aspects of the sound/music are not fixed, but are instead determined by the process or algorithm which has been set in motion. The result of this process is not captured on tape, but rather is presented live, creating a mutable, ever-changing sound work. The three artists whose work is represented here each utilizes a completely different approach to their work, which helps to give a sense of the wide range of work currently being done in the field of "sound art" in general, but more specifically of the possible approaches to the creation of work employing dynamic systems.

In Peter Gena's DNA-based music, DNA sequences are used as the source material for creating musical structures by means of various algorithms which "decode" these sequences into music. In the electronic versions of these pieces, they are not to simply be performed off a tape, but rather are to be created anew for each performance.

Ed Osborn makes use of simple and direct mechanical systems in his work to create processes which, when set in motion, control various aspects of the sounds being presented. In Osborn's case, he is specifically interested in the creation of processes which are "visible to the eye" so that the listeners can immediately perceive the relationship between the process and what is being heard.

Finally, in my own work, I rely on embedded microcontrollers to control (via a computer algorithm) many small mechanical sound making devices. These pieces are most often concerned with the natural environment, and with echoing, borrowing from and reshaping systems and processes found in nature. These pieces may be interactive, or not, but in either case what is most important is that through some combination of complexity or indeterminacy, these algorithms include the possibility for sequences and combinations of sounds to occur which where not specifically predetermined by the artist.

Shawn Decker
Associate Professor
Art and Technology Studies, Sound
School of the Art Institute of Chicago

Cover:
Ed Osborn, *Parabolica,* Installation, *5 x 7 meters,* at Yerba Buena Center for the Arts San Francisco, CA. March 1996.

members' news

Dan Kottke writes: "I went in on the big Burning Man ELF purchase recently (electro-lumi-fiber) and bought a large amount in 6 different colors....There will be a lot of glowing fiber art in the bay area the next couple of years! I'm also looking forward to installing a couple of my cyberlights on Kesey's bus Further, thanks to R. We are going on the upcoming trip to England, In Search of Merlin...."

Helaman Ferguson, a mathematician-sculptor who uses a unique computer setup in his work, gave the si99raph keynote address in August.

Sonya Rapoport has just launched her new piece, *Make me a Jewish Man*: An Alternative Masculinity, about which she gave a presentation on the Women's, Art and Technology panel at Invencao in Sao Paulo, Brazil this summer. This panel was sponsored by Leonardo in anticipation of their coming book on this subject by Judy Malloy. It's on the web: http://users.lmi.net/sonyarap/mmajewishman

Diane Fenster was juror-curator of "DPI - Digitally Propelled Ideas," a national juried exhibition.

Dorothy Krause and Judith Montcrieff are among the members of Digital Atelier™, a group that is exploring the use of computer fine arts on cloth, ceramics, and most spectacular of all, lenticular screens. The lenticular presentation allows each layer of the full-color digital montage to seem at a certain depth behind the other. They had a large booth at the Seybold conference. Judith is also co-founder, with Helen Golden, of Tradigital™ Fine Art. Their Digital Art Pavilion was seen at the Palo Alto Festival of the Arts in August.

American Film Institute's conference, 20 Years of Digital Cinema, celebrated the works of pioneers and advocates of digital technology in the moving arts. Robert Gelman and Patric Prince were panelists, and Michael Wright was one of the featured artists included in an exhibition of work from EZTV's Cyberspace Gallery. He and Victor Acevedo were among those in its CyberSpace Gallery exhibit.

Kristyan Panzica very recently returned from Prague, aka Praha, where he worked on *Dark Flash* (web performance piece) in league with astronomers and composers.

Magi Bollock is president-elect of the national organization of Women's Caucus for Art. Magi is a sculptor and multimedia artist living in Santa Cruz, CA. the Caucus is dedicated to the task of creating equality for all women in the arts, to improving their economic status, and to ending the marginalization of women in art history.

Ron Pellegrino had a week long engagement as artist-in-residence for the Interarts & Technology Program at the University of Wisconsin-Madison culminating in two public performance-multimedia events that included faculty, students, and staff doing performances based on his visual music work.

Six new electronic art works, *Flickering Signifiers* by Kenneth E. Rinaldo, were shown at the Egg Gallery in Chicago.

Frank Dietrich and Zsuzsa Molnar hosted Manfred Mohr, one of the individuals who pioneered computer art in the 60's and continued to explore hypercubes and other methods in his personal arsenal of Generative Aesthetics. The event included a mini exhibition of Manfred's work.

Corrine Whitaker will be the Y2Clay exhibition, opening online in late November. She also has several digital sculptures in the International Virtual Sculpture Park called Intersculpture, and is showing prints at a figurative exhibition at Gallery O in Dallas. She has written the forward, with four images, for a new book, *Virtual Pose*, by Mario Chakkour, just published and is exhibiting digital prints and sculpture at the Galerie der Giegenwart in Wiesbaden, Germany.

(Continued 0n page 13)

A Physiological Approach to DNA Music (Excerpt)

Peter Gena, Ph.D., and Charles Strom, M.D., Ph.D.

For the past several years, the authors have collaborated on a series of algorithmic compositions that employed physiological properties of DNA sequences. The musical results, initially generated electronically, have also recently been realized as notated compositions to be performed live. What follows is a preview of an upcoming article updating their work. For more detailed information, see Musical Synthesis of DNA Sequences[1].

1.0 Introduction: the music

We have generated musical compositions from a variety of DNA sequences such as blood and liver cells, the polio virus, botulinin toxin (botulism), measles, rubella, four distinct common cold viruses, and the HIV virus (*for Yvar Mikhashoff,* 1995). *Red Blood Cells* (1995) is a mix of five genes that are present in human blood: alpha and beta globin, heme synthetase, transaldolase, and glucose 6 phosphatase. These are realized simultaneously, just as they are produced in the body. The piece was premiered at the XI Colloquium on Musical Informatics at the University of Bologna. It was also broadcast over Icelandic National Radio during a series on American Electronic Music, and presented in Hong Kong at the 1996 International Computer Music Conference.

The first of the DNA works to use live instruments, i.e. where the DNA sequence is outputted as musical notation, was *Collagen and Bass Clarinet*, premiered in 1997 at Aspekte Musik, in Salzburg. Four additional synthesized sequences accompany the solo instrument. *Chopin's Catarrh (Nocturnes)*, is the latest composition to emerge from of our research. When we learned that recent research uncovered that Frédéric Chopin was most likely afflicted with cystic fibrosis rather than consumption as widely believed, we immediately felt the need for a series of piano works. Using the algorithm for converting DNA into musical parameters, we transformed the cystic fibrosis sequence into musical notation. This material was then used as a cantus firmus, not to generate the piece, but to reveal the existent notes embedded in Chopin's music. The actual musical texture of this first work is gleaned from successive measures in the *Nocturnes* that contain aggregates (in varying sizes) of the cf2 (cystic fibrosis cantus firmus). These were taken down in order until the complete DNA sequence was found. As 1999 marks the 150th anniversary of the death of the composer, a series of ensuing works will probe a number of the remaining genres such as the preludes, waltzes, mazurkas, etc.

2.0 DNA

With the exception of Prions, all known life forms on the planet use nucleic acid molecules (either DNA or RNA) to store genetic information. In eukaryotes, protozoans, yeast, and bacteria, the genetic material is invariably DNA. DNA molecules are comprised of long chains consisting of four bases: adenine (A), cytosine (C), guanine (G), and thymine (T). In RNA, the thymine is replaced by uridine (U). The bases are inked to each other by phosphodiester covalent bonds to form the final genetic material. A DNA molecule contains two such chains wound around each other in a structure known as the double helix. In the double helix the base on one strand exactly determines the corresponding base on the opposite strand. Whenever a T residue is on one strand, an A residue will be exactly opposite to it on the other. When a G is on one strand, there will be a C on the complementary. The G-C and A-T pairs stabilize the double helix by forming hydrogen bonds with each other, thus keeping the double helix together. G-C pairs contain three hydrogen bonds and A-T pairs only two, making G-C pairs more stable than A-T pairs.

The order of these bases contains the complete genetic blueprint for a given organism. Within a gene, the sequence of bases will specify exactly the amino acid sequence of a protein chain or RNA species. The exact ordering of amino acids in any protein chain is designated as the primary sequence.
Genetic words (codons) consist of a sequence of three base pairs, i.e. AAA specifies the amino acid lysine and GGG specifies glycine. The genetic code is the dictionary which translates the 64 possible three-base combinations into their corresponding amino acids. The DNA template, located in the nucleus of each cell, acts as a blueprint that directs the production of proteins. After the DNA is translated into a special molecule called messenger RNA, the mRNA is then serially scanned by ribosomes, organelles located in the cell's cytoplasm.

Ribosomes use the mRNA as a template to direct the synthesis of proteins.
Although the primary amino acid sequence of a protein determines its chemical structure, the function of a protein is also determined by its three-dimensional conformation. Proteins fold up on themselves and have areas, or domains, that may anchor them in a cell membrane or cause them to be secreted out. This is called secondary structure. Secondary structure is dependent on the chemical properties of each individual amino acid and how it relates to chemical properties of its neighbors. Any algorithm whose purpose is to convey information in a meaningful way regarding structure and function of proteins must take into account both the primary (amino acid sequence) and secondary (chemical properties of the amino acids, hydrophobic/hydrophyllic nature, Pk(a), and molecular weight) structures.
We implemented an additional level of complexity by using the physical nature of the codons themselves. The codons that are more G-C rich will be more difficult to pull apart than A-T rich codons. This can be measured as the melting temperature of the codon and can be approximated by the formula of 4 (G + C) + 2 (A + T) in degrees Celsius.

3.0 Physio-musical conversion: a brief overview

The first major programming task was to write an algorithm that converts the list of sixty-four codons into distinct musical events according to the above-mentioned physical properties. A look-up table of the codons and their corresponding amino acid types, followed by the dissociation constant or Pk(a) and molecular weight, was constructed as a data-base (Figure 1). Musical parameters are calculated by combinations of these physical properties.

Each of the nineteen amino acids has a distinct Pk(a) that helps define pitch. Additional modifications involve physical properties of the molecular bonding occurring in the codon itself, independent of what amino acid it codes for. A pitch-bend command on each note places the music in just intonation. Intensities (velocity) are also adjusted according to the hydrogen bonding occurring in each codon. The Pk(a) and atomic weights of the amino acids determine duration. There are eight basic timbres; one for each of the eight classes of amino acids.

4.0 Realization

The preliminary programming prepares all the necessary data, that is, the table of codons (Figure 1), and the genomes as collections for the MAX object code language (Copyright by IRCAM and Opcode Systems). The initial table data contains the codon, followed by its amino acid, Pk(a), amino acid class numbers, and the molecular weight of the amino acid.

```
11, TGT, CYS, 1.900, 6, 121;
12, CCG, PRO, 1.952, 7, 155;
13, CCC, PRO, 1.952, 7, 155;
14, CCT, PRO, 1.952, 7, 155;
15, CCA, PRO, 1.952, 7, 155;
16, ACG, THR, 2.088, 1, 120;
```

Figure 1: Codons 11 - 16 from the look-up table

Each codon is transformed into a list in a collection (Figure 2). The list specifies the address, MIDI pitch, velocity, channel number, pitch bend, and duration of the event for the corresponding codon.

```
11, 26 60 6 24 23;
12, 38 120 7 1 31;
13, 35 108 7 19 30;
14, 32 78 7 26 30;
15, 32 96 7 26 30;
16, 34 108 1 28 25;
```

Figure 2: Corresponding MAX collection

A second series of algorithms reads the raw DNA strings for a genome, searches for the start and stop codons, and then forms the three-letter codon sequences. Uncoded filler, ubiquitous extraneous material bearing no significance to amino acid production, is ignored. In addition, each codon from the genome is checked in the look-up table and its codon index number is put into another collection as follows:

Beta Globin sequence:
ATG ATG ATG GTG CAC CTG ACT CCT GAG GAG AAG TCT GCC GTT ACT GCC CTG TGG GGC AAG GTG AAC GTG GAT GAA . . . . etc.

Corresponding MAX collection:
1,32;2,32;3,32;4,33;5,56;6,42;7,17;8,14;9,23;10,23;11,64;12,24;13,46;14,36;15,17;16,46;17,42;18,54;19,52;20,64;21,33;22,30;23,33;24,20; . . . . etc.

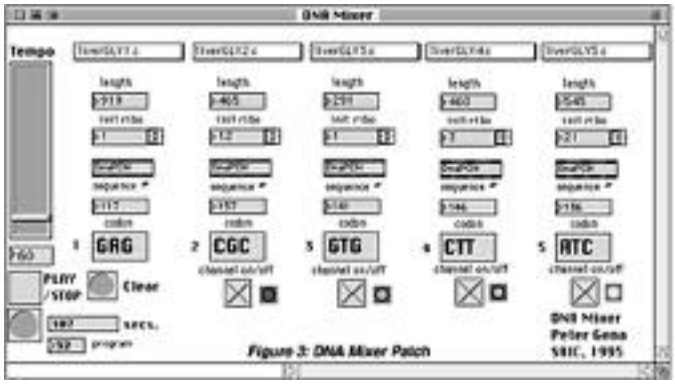


Figure 3: DNA mixer

Complete genomes of human or bacterial proteins, or complete viruses are then scanned by a MAX patch, DNA Mixer (Figure 3), so that each of the codons is culled from the data-base table (Figure 2) and then played in real-time linear sequence. Each “channel” of the mixer is made up of a sub-patch that plays the sequence via the look-up (data-base) table. The event-scheduling for each “track” is handled by an embedded sub-patch, which in turn uses yet another, a rhythm processor, to monitor duration. The present DNA mixer can execute up to five individual sequences at different starting points. This process is analogous to the scanning of the mRNA by the ribosomes as it adds amino acids sequentially to make proteins—a process not unlike several cars (ribosomes) on a roller coaster negotiating the identical track (mRNA), but at different locations, speeds, and spacings.
This creation of polyphony is analogous to the way multiple ribosomes run along a single strand of mRNA.The DNA mixer can realize the sequences as digital sound and/or print them out in musical notation. Ideally, performances of the digitally synthesized pieces should be done live from the computer, where the ribosome simulations can be set spontaneously before each playing.

1. Peter Gena and Charles Strom. *Musical Synthesis of DNA Sequences* . Sixth International Symposium on Electronic Art, Montreal, 1995: 83-85. XI Colloquio di Informatica Musicale, Univeristà di Bologna, 1995: 203-204. XXXXXX

YLEM CALENDAR

For the latest in news and events see our site: www.ylem.org/NewSite/news/Calendar.html

Some calendar items are reprinted from Art Calendar (the monthly marketing and career management journal for artists, P.O.Box 199, Upper Fairmont, Md; Subscriptions $32/yr), Artweek, Leonardo Electronic Almanac, Artech <artstech@the city.sfsu.edu>, and Fine Arts Forum Online <paulbrown@siggraph.org>.

We cannot verify all information sent to us. Please inform us of incorrect information.

All events and exhibits are in the San Francisco except where noted.

We want your announcements!

To insure that they appear in the next newsletter send 6 weeks before the publication date. Announcements may be e-mailed to Lewis Bangham at Banghaml@hotmail.com. Also send notices to the Ylem website where they can appear on shorter notice. Please see web site guidelines. (Address on back cover.)

YlemForums are held the second Wednesday of January, March, May, July, September and November at the Exploratorium, 7:30 pm.

Ylem Field Trip

Scanning Electron Microscope (SEM) Demo
11 am Saturday, October 30. Lunch together afterwards. University of Pacific Dental School, 2155 Webster St., San Francisco.
(actually meet around the corner at Sacramento St. entrance) Bring small samples. Limited to 10 people, so contact Trudy to sign up! 650-856-9593, trudymyrrh@aol.com

Events

November 12, 13, 14
Traditions in Transition
Tri-State Sculptors fall conference and exhibition is an informative look at sculpture and sculptors in the period. This conference is sponsored by the Tri-State Sculptors Educational Association to promote public awareness and the appreciation of sculpture and to exchange ideas and information. Membership is open. For more info call Charles Wright Chair, Department of Art, Costal Carolina University, P.O.Box 26195, Conway, SC 29528-6054. phone 843-349-2701 or 843-445-9105. e-mail wright@costal.edu

November 3 7:30PM.
Mills College Lectures on Contemporary Art
Talk by Robert Atkins. Atkins is a New York based art historian currently specializing in new media and on-line art while continuing to focus on gay/lesbian artists.

November 14-17
Publishing on the Web
A Stanford workshop for magazine, book, association, and newspaper professionals. This workshop is for publishers interested in enhancing their understanding the problems, issues and opportunities associated with publishing on the web. For more info. Phone: registrar Ann-Marie Lerone at 650-725-6259. Fax 650-725-9712. Email publishing.courses@alumni.stanford.org. Website: www.stanfordproed.org. Mailing address: Publishing Ventures, Stanford Professional Education, Bowman Alumni House, Stanford, CA 94305-4005

September 24-25
GOVERNING THE COMMONS:
THE FUTURE OF GLOBAL INTERNET ADMINISTRATION
A conference by Computer Professionals for Social Responsibility (CPSR) Ralph Nader will give the keynote speech at CPSR's conference on globalInternet administration. The conference, to be held in Alexandria, Virginia, on September 24 and 25, will examine the issues surrounding the creation of the new private Internet corporation, ICANN, to manage core technical functions of cyberspace. A full conference announcement is below.
Computer Professionals for Social Responsibility (CPSR), Hilton Mark Hotel Alexandria, Virginia
http://www.cpsr.org/conferences/dns99/dnsconf99.htm or
http://www.cpsr.org

The conference program addresses the following topics:

1. Introduction to the Issues
2. Competition in the Domain Name System
3. Technological Change and Institutional Design
4. Stakeholder discussion
5. The Big Picture: The Emerging Institutional Order

To register for the conference, please see:

http://www.cpsr.org/conferences/dns99/dnsconf99.htm or
http://www.cpsr.org
Or send email to:
cpsr@cpsr.org
http://www.cpsr.org/
Computer Professionals for Social Responsibility
P.O. Box 717 * Palo Alto * CA * 94302
Phone: (650) 322-3778
*

ChatterBox 1.0
ISEA/Inter-Society for the Electronic Arts is pleased to announce a new project. ChatterBox is a series of moderated discussions on ISEA-Forum, a listserv which is open to both ISEA members and non-members.
The discussions will be on selected and specific topics in the electronic arts.

New Media Art Collectives
The first intervention will be launched Wednesday, September 8 1999 with a new text each following day. You are invited to intervene, discuss, comment! See below on how to subscribe to ISEA-Forum.
Guest Moderator:
Laura McGough, Nomads (USA)
http://www.nomadnet.org
Panelists:
Conor McGarrigle, Stunned Art Zine (Dublin, Ireland)
http://www.stunned.org
Moritz Gaede, drivedrive inc. (Canada/Amsterdam)
http://drivedrive.com
Natalia Manzhali, Info Media Bank Program, SCCA Kiev (Ukraine)
http://www.cca.kiev.ua/

Subscribe to ISEA-Forum
Send an email message to <listproc@uqam.ca>. Leave the subject field blank and in the body of the message write: subscribe ISEA-forum <your first name and last name>.

Call for Proposals
ISEA launches an open call for potential guest moderators to send us ChatterBox proposals. The guest moderator of each edition of ChatterBox is responsible for finding and obtaining the texts of the 3 or 4 panelists, as well as for writing a short 500 word overview.
ChatterBox will be a bi-monthly affair beginning this September. Please send your ideas and proposals for ChatterBox to:
Katarina Soukup
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ISEA/The Inter-Society for the Electronic Arts
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http://www.isea.qc.ca
CARTOGRAPHIES:
Toward a Definition of New Media Art
The ISEA/Inter-Society for the Electronic Arts General Assembly on New Media Art... landmarks .. survey .. traces .. traps .. paths .. manifestoes .. artists.. presence.. dispatches .. trajectories .. inventory .. cartography .. circulation.. networks .. projects .. institutions .. conservation .. archiving .. industry .. links .. ghettos .. convergences ..... virtual communities .. hybridity .. mutations .. diffusion .. intersections .. displacements .. languages .. machines .. authors .....
http://www.isea.qc.ca/carto
Cross-Canadian and International Encounters
Montreal, Canada
Complex Ex-Centris
12-14 October 1999
information:
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Fax: +1.514.847.8834 *
email: isea@isea.qc.ca *
http://www.isea.qc.ca

Exhibits
Sept 28-Oct 29
“Recoil” a sound installation by Ed Osborn. Ed uses sound as a primary material which takes forms including installation sculpture, video, and performance. Artists talk on Tuesday, September 28 from 5-6 PM,, in room #133, Art Building. Followed by a public reception from 6-8 PM in the Natalie & James Thompson Art Gallery at San Jose State University.

Cote Quest: Contemporary French Art at the Exploratorium
Nov 1-14
Sound installation by Celeste Boursier-Mougenot
January 18-February 6, 2000
Video installation “Are You a Masterpiece?” by Sylvie Blocher
Boursier-Mougenot’s sound installations draw on physics, randomness and everyday materials to create art that is surprising, contemplative and intriguing. Blochet’s video installation turns to an unlikely source- the Princeton University football team- for an examination of religion, art, heroes and self perception.
Exploratorium, 3601 Lyon Street, San Francisco, Ca 94123-1099
415-563-7337.
Pubinfo@exploratorium.edu
www.exploratorium.edu

Opportunities

deadline 1st October 1999

Call for papers

ACM Hypertext '00
The 11th ACM Conference on Hypertext and Hypermedia
San Antonio, Texas, May 30 - June 3, 2000
http://www.ht00.org
Hypertext 2000 is the 11th in the premier international series of ACM conferences on hypertext and hypermedia. ACM Hypertext 2000 will be co-located with Digital Libraries 2000,
making it easy for delegates to attend both of these highly relevant
conferences one after the other. Both conferences are being held in the beautiful and historic Menger hotel, located in the heart of San Antonio, Texas.
Critical Dates for Hypertext 2000: October 1, 1999 Full Papers, Panels, Workshops, Courses and Technical Briefings due December 1, 2000 Notification of acceptance January 17, 2000 Short papers, Posters, Demos, Doctoral Consortium and Exhibit submissions due February 1, 2000 Acceptance notification for Short papers, Posters, Demos, Doctoral Consortium and Exhibits. Final version of all contributions due May 31 - June 2 Hypertext 2000 Conference
May 30; June 2-4 Digital Libraries 2000 and Hypertext 2000 workshops and courses
For more information about Hypertext 2000, see the home page at http://www.ht00.org

Deadline Dec1
Call for entries
Brainwash festival of short movies. Entries must be original and less than 13 minute in duration. The submitted material must be on VHS(NTSC). The entry fee is $30. For more info contact The Brainwash Movies Festival @ www.laughingsqi\uid.com/brainwash
submissions should be sent to Shelby Toland, P.O.Box 881911, San Francisco, Ca 94188

Absolute Vodka
Absolute Citron is awarding three grants of $50,000 for unique business concepts that marry art and technology. Got to www.absoluteangle.com for information.

Deadline: October 19
12th National Computer Art Invitational. Open to all media created and/or generated by computers. Must be produced on hard copy format, i.e., photography, printout, painting, drawing, collage. No software programs accepted. For prospectus SASE to Gallery of Art, Department of Art,/MS102, Eastern Washington University of Art, Cheney, WA 99004. 509-359-7070, Fax 509-359-4841. Web: visual.art-sewu.edu

Deadline Oct, 31
Farewell to the 20th Century 11/10 - 12/11
Open to all artists. Entries must be mailed (postcard size) or faxed, and should be an examination of the 20th century and all her movements. All work accepted; entries not returnable. Documentation will be provided. Send to Farewell to the 20th century, Central Michigan University, c/o Patrick Smidt, 132 Wightman, Mount Pleasant, MI 48859, or fax: 517-774-1898

Deadline: Nov. 17
Art Wired International 3/3 - 4/7. Two Texas universities are coordinating a juried exhibition of non-commercial computer dependent art. Art may include digitally-derived works, installations and traditional art forms which could not exist without a computer. The exhibit will be on both campuses and internet-based. Submit work by slides, e-mail, disk (Mac or Windows 95 runtime version) or videotape (VHS derived from digital images).
Compatibility of formats responsibility of the entrant. Notification of unreadable files within one week. Non-returnable entry fee of $25 per submission. Cash awards. For a prospectus send SASE to: O'kane Gallery, University of Huston Downtown, One Main Street, Houston, TX 77002. Email-ArtWired@dt.uh.edu .xxxxxx

For a more comprehensive and up-to-date calendar, please visit our web site at http://www.ylem.org Click on News and Events and then on Calendar

The Physical Presence of Sound

Shawn Decker

As a musician, I have long been interested in the spatial properties of sound, and their use in musical composition. Much of my previous work with computer music had dealt with this issue in some way or another, culminating with extensive research which I undertook some years ago with Gary Kendall at Northwestern University to explore the creative possibilities of simulated 3-D spatial sound perception over stereo loudspeakers and headphones. More recently, however, I have become less interested in the creation of "virtual" sound fields created with loudspeakers than with sounds which are created

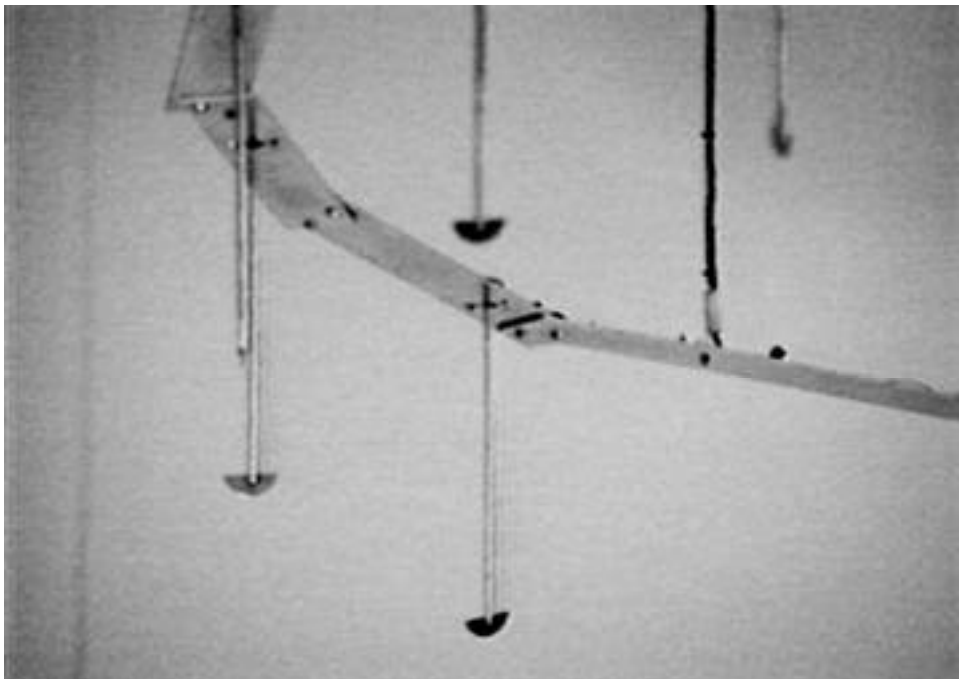

Figure 1: *Divided Circle: Music for 16 Stirrers* (detail)

directly by physical means (meaning by this the striking, bowing, or vibration of physical objects). These works have largely to date been presented within an installation venue, although I am also very much interested in the performative possibilities of these ideas as well.

I am attracted to a number of things about these "physically" produced sounds. First, they can be physically distributed within a space, providing for the possibility of highly spatialized sound patterns which entirely surround the listener. Secondly, I find that sounds which are radiated from uneven surfaces of various shapes, (as opposed to the perfectly shaped cones of speakers), contain delicate and subtle differences from a recording of these sounds produced by loudspeakers. Even though it is possible to exactly simulate a sound pressure wave made by an object with a speaker, it is not possible to recreate the subtle variations of the radiation and diffusion patterns of the sound (which are, for instance, often different in each direction when an object is irregular in shape). Likewise, sound waves which are produced by objects with large flat surfaces radiate in patterns which are impossible for "point-source" transducers like speakers to completely recreate. Following these distinctions,, my pieces tend to focus on both the spatiality of the sounds, (with lots of smaller sound distributed and organized spatially), and with quiet and subtle sounds which combine in mass to create sound fields which surround the listener. In many ways these works resemble large "music boxes" which allow the listeners/viewers to enter right into the machinery and be completely enveloped my the sounds it produces. I more typically though imagine these works as a sort of perpetual music which is being "performed" continuously by the system I have constructed.

One of the key technological developments which made my transition from speakers to physically produced sounds was the recent availability of dedicated microcontrollers. These small computers allowed me to construct works which combined a physical means of sound production with an embedded algorithmic control mechanism which is capable of precisely coordinating and controlling the physical production of the sounds. Likewise, these microcontrollers allowed the "composition" contained within the algorithm to be responsive and reactive, as well as to include indeterminate actions along with more fixed sequences and formal elements.

In *Divided Circle: Music for 16 Stirrers* (Fig. #1) , the

(continued on page 12)

Visible Systems: Recent Sound Installations

Ed Osborn

In my work in sound sculpture and installation I like to have technical systems visible, audible, and out of the box. The kind of hidden calculations that computers and other electronic control systems are designed for (and very good at) are only intermittently useful for this kind of work. Though I sometimes build circuits to control my pieces, I try to limit their scope to simply supporting the physical and conceptual requirements of a piece rather than have them be the secluded heart of it. Below I describe two pieces that operate in varying degrees on this principle.

Night-Sea Music

In *Night-Sea Music*, many small music boxes are driven by slow electric motors attached to them via rubber cables which curl and release intermittently. The piece is titled after a John Barth story, Night-Sea Journey, which is narrated by a confused and not altogether enthusiastic single spermatozoa on its journey in search of...well, something (the narrator is not very clear on the concept). The twisting and spasmodic movements of the piece alludes to those tiny twitching travelers whose brief existence is a suicidal mission to carry information through a difficult environment. The music boxes all play the old folk tune "The Merry Widow," which seemed an apt choice considering the overwhelmingly futile energies expended by all those determined sperm.

The motors run at slightly different speeds depending on the amount of slack between them and the music boxes to which they are attached, so there is no way to synchronize the content of music boxes. While the flavor of the melody is heard, the overall contour of its progress is diffuse and meandering. This diffusion is both temporal and spatial since individual notes or clusters of them are heard randomly from various points across the wall where the piece is mounted. The factors causing the different rates of playback - the amount of slack on the rubber cable and the angle of that cable on the wall - are clearly visible, and these physical constraints provide both visual appeal and easy access to the "calculations" behind the varying speeds of the boxes. To further emphasize the tactile presence of the piece, the rubber cables make a mark of their motion against the wall, thus leaving a physical trace of the amount of their actions.

Ed Osborn *Night-Sea Music* (1998) Installation view at Galerie DARE-DARE, Montr≥al, Quebec, January, 1998 (dimensions variable).

Night-Sea Music grew out of another series of works where I needed to have music boxes driven via motors rather than by manual winding mechanisms. While the rubber cable coupling didn't work for that project, its sperm-like motion did bring to mind the Barth story and the framework for the piece was quickly established. The technical implementation of the piece turned out to very simple. The motors are driven in parallel off of one small pulse width modulation circuit which activates for several minutes at the touch of a button. The piece is set up to run this way rather than running continuously more to preserve the sanity of the gallery staff than to prevent wear and tear on the motors and cables - though it doesn't hurt there either. The electrical cables that carry the current wind between the music box mechanisms and branch as needed to reach the motors. The wires themselves are a visual element of the work and complement the twisting of the rubber cables with sinuous but static shapes. As with some of my other works I have made no attempt to quarrel with the propensity of electrical cable to curl and be generally unsympathetic to attempts at imposing order over it.

Parabolica

In *Parabolica* (photo on cover), a model train with a speaker attached to one car broadcasts a variety of sounds as it circulates around a track. The single track comprises a closed loop, with one part of the loop splitting into an elaborate switching matrix of many paths that eventually feed back onto the single track. The switch settings in the matrix are changed randomly each time the train circles the track such that the its trajectory is different each time it passes through the matrix. Over time the train takes the center routes more often, thus describing with its motion the statistical form known as the bell curve. The sounds heard come from a variety of sources and refer to authority, forces of nature, personal presence, and social context.

The title, *Parabolica*, refers both to the shape of the statistical form it
describes and to the final turn on the Monza autodrome in Italy. A difficult and high-speed curve, it is the point where race results are often determined and the one turn on the course that must be made perfectly in order to cross the finish line first. The title's twin references to varying notions of Darwinian competition is present with each cycle of the train around the track: the instant effect of taking one turn over another and the slow etching of the bell curve in space. So while the sounds of personal determination are heard - voices describe the process of making decisions, planning things, performing evaluations - the vehicle carrying those sounds is itself illustrating the law of averages by following routes over which it has no control. This entire conceptual premise still seems rather depressing to me, but there is something about model trains that counteracts it. Maybe it's the enticement of a model-perfect world or the fact that one can have the illusion of control over it.

The origin of the piece happened one day when I was looking at a set of train tracks and realized that they could be used as a wire to carry an audio signal to a speaker. For some time I had been trying to find a method by which I could make use of an electronic sound source moving through space, but the problem of powering a sounding device always intervened (neither battery power nor running trailing cables behind the moving and sounding object were appealing as solutions). However, the materials for model train sets already had the necessary components for carrying electric current to a moving train car, and configuring one to pick up an audio signal on top of the current used to drive an engine was relatively simple. The audio signal is picked up on one rail through one of two trucks (a set of wheels connected to a train car body), passed to the speaker and then out to the other rail by the other truck (the steady DC current used to drive the engine is filtered out using a capacitor matrix).

The track was intentionally designed as a set of continual curves with no straight segments between them. This comes in part from spending far too much time being hypnotized by watching racing cars navigate sweeping corners (and knowing that the curves are where the good drivers are separated from the pack), and in part from not wanting to suggest any point of rest for the driver at the helm of the train. The track is suspended so that it sways slightly with the movement of the train across it, lending an aspect of hazard reinforced by the lack of any protective barriers between the train and a fall to the floor. This, I realized after building the piece, is the kind of undulating single-lane roadway depicted in many Dr. Seuss books (childhood strikes again). And while I was happy to recall the association, I did have to wonder how much the rest of my imagination had been bell-curved by well-meaning adults when I was too small to be aware of it. Fortunately, I will probably never know. xxxxx

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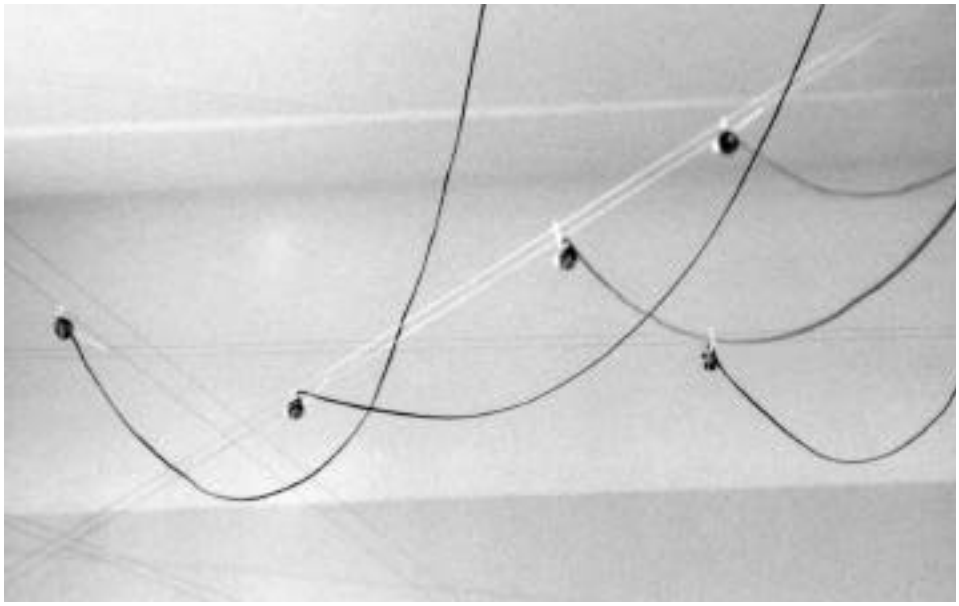
sounds of the piece are produced by sixteen paint stirrers - (the kind normally mounted on a power drill and used to stir paint). These stirrers were simply "found objects" which produced a wonderfully delicate "tink" sound when spun slightly. The piece physically consists of two arcs suspended from the ceiling so as to form a circle of about 10' in diameter, with the 16 stirrers placed at points along each arc and activated by a small motor which pulses very gently, spinning the stirrer slightly, and making the "tink" sound described above. The physical structure is based on western analytical concepts, such as the approximation of a circle with line segments, and the placement of the stirrer elements along the circle is based on trigonometric functions. When the listener stands in the center of the circle, the sounds move completely around them in a highly spatialized manner. The piece is controlled by a small computer program residing in the microcontroller which produces both fixed and indeterminate patterns within a 24 hour cyclical time structure. These rhythms, which are modeled on bird-songs and other "natural" rhythms as well as on Indonesian Gamelan structures (which are cyclical in nature), are intended to contrast with the more analytical "western" elements of the piece's physical structure. The bird-song derived rhythms tend to have continuous spatial paths around the circle, but are indeterminate as to length of time, while the Gamelan derived patterns are disjunct spatially - hocketing back and forth between various points on the circle, but following precise patterns which divide the circle into various sub-patterns which are each of precise temporal duration. This work is intended as a continuous "automated" musical performance, spatially conceived and realized.



Another work of mine which functions in a similar manner is the installation *Wire Field* (Fig. 2) which was installed at the *Turun Taidemuseon*, Turku, FINLAND, from June 1 to Aug. 24, 1997. In this installation, 32 sets of piano wires were strung from wall-to-wall within a gallery space roughly seven feet above the ground, in 16 paired sets. The wires, which are arranged to fill the entire space and are tuned specifically to it, are struck by small motors spaced throughout the gallery, which are supported by one of the paired wires, and strike the other wire in the pair with a small plectrum (and vice-versa). The position of each motor on the wire serves as a tuning mechanism for the wire, as sliding the motor along the wire changes the pitch of the resultant vibration. The motors are activated by a computer program which monitors and reacts to the sounds inside the gallery as well as to the actions of the other motors throughout the space. In addition, microphones are placed outside of the gallery to monitor the environmental sounds from outside, in this case sounds from the surrounding garden. The computer program in this work operates in a manner similar to a biological and other natural system, where each single sound is produced (by a string being struck) as a reaction to those sounds produced by the strings in the space immediately around it, as well as by other sounds in the gallery. While the rules of behavior for each string are quite simple, in combination these 32 strings, each sensitive to several of its immediate neighbors, create a complex and delicate system of interdependencies which is intended as a direct analogy to natural systems found in the environment around us. This system is easily "disturbed" by spectators or by sounds in the gallery and immediately outside the gallery in the adjacent garden, and produces very elaborate responses to and interactions with the environment around it.

In fact, the complex interrelations contained within this system make it impossible to predict - even for the artist - exactly the full range of responses and "sonic environments" which will emerge from the system over time.

My most recent work *The Night Sounds* consists of four corrugated metal water buckets, each approximately half-full of water, which are suspended from the ceiling by piano wire. The buckets are each placed in the corner of
an 8' to 12' (12' being optimal) square of space in the room. Attached to the top of each length of piano wire (the tension of which is supplied by the weight of the bucket, and is regulated by the amount of water in the bucket) are small motors, with a thin cord attached to each motor shaft which strikes the string once every revolution of the motor. A micro controller controls the acceleration/deceleration and overall speed of each motor independently. The speed of the motors varies widely, from only a few revolutions per second (simple ticks) to several thousand revolutions per second (in the audio range, causing complex interference patterns between the frequency of the motor and the resonant frequency of the piano wire). The buckets themselves serve as a "sounding board" to amplify and radiate the sounds.

The piece, like much of my work, is quiet and subtle in nature. The sounds produced are designed to "coexist" with other environmental sounds in the gallery, and thus the piece does not require complete isolation (but a reasonably quiet location is best). The patterns of the piece as well as the nature of the sounds is modeled after crickets and cicadas found in the midwest, both here in Chicago, where I now live, and also in Western Pennsylvania where I grew up. In both these locations, these sounds are ever-present in the summer, literally at times taking over the entire landscape with their sonic intensity. The means of sound production in this piece is, for me, highly organic, and extremely spatial in nature, with the metal buckets themselves serving as the resonators and sounding boards for all the sounds produced. These water buckets also reference my childhood days of farm life, where buckets just like these were hung from the rafters of barns to catch leaking water. xxxxx

members' news

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Jim Thompson writes: "I now work at LTX Corp which makes high speed chip testing machines for testing all those darn microchips. These machines are as big as10 big refrigerators put side-by-side and have a big circular "pod" where each chip is placed. The chips inside run so hot that they have a water cooling system that pumps chilled water over heat sinks on the chips. It's pretty far out!"

Patricia Tavenner will show some of her computer painting/prints dealing with the rhythms of dance, the colors of her garden, and the transparency to time. These will be on view at the Communications Technology Cluster at 2201 Broadway, 2nd Floor, Oakland, California. Monday through Friday 9-5 and through November 1999. The reception is Friday Sept. 24th from 5-9
pm.

YLEM board member, Cliff Pickover, just published "The Science of Aliens" (Basic Books, ISBN 0-465-06314-X). It is lavishly illustrated and contains scientifically-based speculation regarding alien life. The illustrations and frequent references to popular culture should make it appeal to all ages. More information on "The Science of Aliens" can be found at http://sprott.physics.wisc.edu/pickover/soa.htm. xxxxxx

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n., pronounced eye-lum, 1. a Greek word for the exploding mass from which the universe emerged.

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